

ABSTRACT

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The present invention discloses, in certain aspects, a system and method for improving vibratory source seismic data in which a filter is produced which converts a recorded seismic groundforce signal (including harmonic distortion therein) into a desired short-duration wavelet which is used as the basis for generating a filter for application to the seismic data. In one aspect, the present invention provides a seismic data method for recording and processing vibratory source seismic data, the method including applying with a vibratory source system a groundforce signal into earth at a selected location, said groundforce signal having a temporal duration and including a reference sweep signal and non-linear noise, recording with first recording apparatus said groundforce signal, generate a filter for converting a time derivative of said groundforce signal to a short-duration wavelet with a temporal duration less than the temporal duration of the groundforce signal, recording with second recording apparatus at least one reflection signal from a location within the earth of said groundforce signal, and applying said filter to said at least one reflection signal to refine seismic data represented by said at least one reflection signal producing refined seismic data about the location within the earth. A method for making a shaping filter has been invented for improving seismic data by dividing a Fourier transform of a short-duration wavelet by a Fourier transform of a time derivative of the groundforce signal, the short-duration wavelet having a bandwidth greater than that of a reference sweep signal included in the groundforce signal.